

Enhanced Path Planning, Guidance, and Estimation Algorithms for NASA's GMAT, Phase II

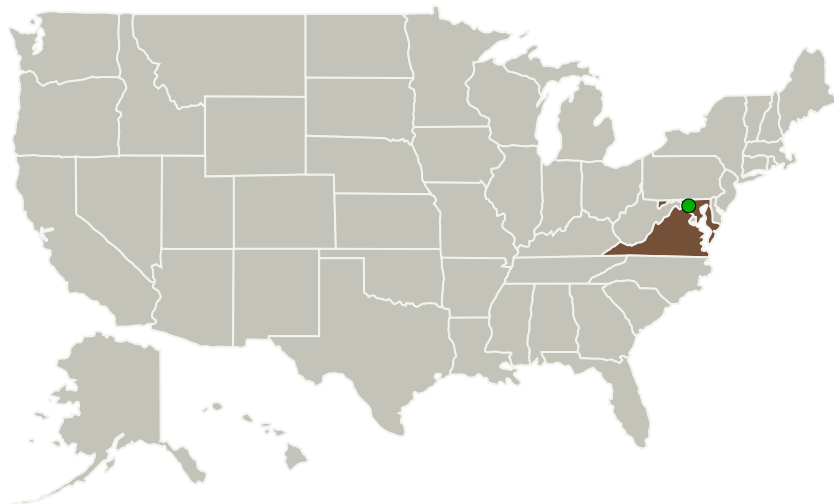
Completed Technology Project (2013 - 2015)



Project Introduction

Advanced trajectory design and estimation capabilities in complex nonlinear dynamical regimes represent two of the greatest technical challenges of modern space flight. The impact of nonlinear effects in both path planning and estimation is often most noticeable when the spacecraft under consideration transitions through a region of space where multiple exogenous perturbations become significant. Perhaps the most salient example of such effects are libration point missions. To address these challenges, DECISIVE ANALYTICS Corporation seeks to advance the capabilities of NASA's open source General Mission Analysis Tool (GMAT) by integrating the latest advances in trajectory path planning and estimation, including multi-sensor data fusion. This includes the development of an advanced path planning capability that leverages concepts from dynamical systems theory, multi-phase targeting, and visualization for trajectory design in regions where multi-body effects are significant. Parallel to that, we are developing an advanced estimation capability that leverages approximately \$10 million of research and development performed by DECISIVE ANALYTICS for the Missile Defense Agency (MDA) and the US Air Force. The capabilities sought during Phase II will leverage two GMAT prototype plugins, developed as part of the prior Phase I effort, that partially demonstrate some of the functionality proposed.

Primary U.S. Work Locations and Key Partners



Enhanced Path Planning, Guidance, and Estimation Algorithms for NASA's GMAT Project Image

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Organizations Performing Work	Role	Type	Location
Decisive Analytics Corporation	Lead Organization	Industry	Arlington, Virginia
● Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations	
Maryland	Virginia

Project Transitions

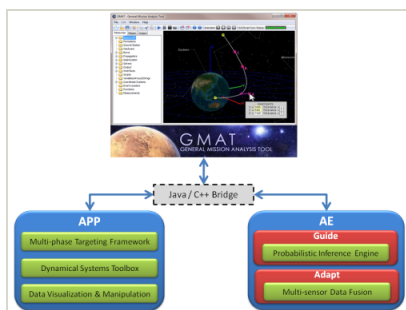
▶ **January 2013:** Project Start

✓ **June 2015:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/137316>)

Images

**Project Image**

Enhanced Path Planning, Guidance, and Estimation Algorithms for NASA's GMAT Project Image (<https://techport.nasa.gov/image/126691>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Decisive Analytics Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

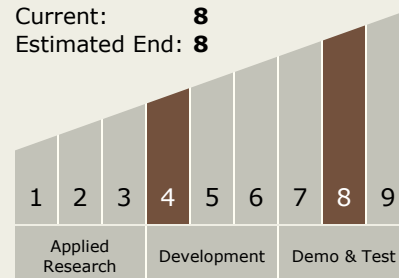
Carlos Torrez

Principal Investigator:

Belinda Marchand

Technology Maturity (TRL)

Start: 4
Current: 8
Estimated End: 8



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Technology Areas

Primary:

- TX17 Guidance, Navigation, and Control (GN&C)
 - └ TX17.2 Navigation Technologies
 - └ TX17.2.3 Navigation Sensors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System